REMARKS

I. Status of the Claims

Claims 1, 4 and 8-22 are pending in this application. Claim 12 has been amended to correct a clerical error, and no new matter has been introduced.

II. Rejection under 35 U.S.C. § 103(a)

A. Claims 1, 4, 8-12, and 14-22

The Examiner has rejected claims 1, 4, 8-12, and 14-22 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,597,039 to Ohmi et al. ("*Ohmi*") in view of U.S. Patent No. 6,162,705 to Henley et al. ("*Henley*") for the reason disclosed on pages 3-7 of the present Office Action. Applicants respectfully disagree and traverse this rejection for at least the following reasons.

In the Office Action, the Examiner asserts that "Ohmi ... disclose[s]... separating a composite member ... by applying a thermal treatment (heating) to the composite member, wherein in the separation area (weakened zone), the peripheral (twice-implanted/super-weakened region) region is the first to crack (cleave)." Office Action mailed June 29, 2007, at 6-7 (citations omitted). The Examiner further states that "during the same thermal treatment, the main (once-implanted) region is the second to crack" with the result being "the total separation of the composite member." *Id.* at 7. Given this, the Examiner concluded that "in order for the entire composite member to be separated," the thermal treatment needed to be "applied substantially evenly over substantially the entire composite member (including the entire weakened zone)." *Id.*

Ohmi does not, however, disclose such a thermal treatment. The Examiner admits this omission in the current Office Action. *Id.* at 3 ("Ohmi does not *specifically* disclose applying the heat substantially evenly over substantially the entire weakened zone to initiate and propagate detachment.") (second emphasis added). Nevertheless, the Examiner attempts to rectify this shortcoming by stating that "Henley ... use[s] uniform heating of the *entire* substrate to initiate the cleaving action." *Id.* at 4 (emphasis added).

Henley discloses a method of "removing a thin film of material from a substrate using a controlled cleaving action." *Henley*, col. 2, lines 24-26. The controlled cleaving action in *Henley* uses selective placement of pulses of energy at or near the edge of the target wafer. *See*

id.; see also id., col. 13, lines 13-20. This energy pulse self propagates from the selected region through the wafer until the thin film of material is removed. *See id.,* col. 9, lines 17-22 ("A directed energy source ... provides an application of energy to a selected region of the substrate material to initiate a cleave front which self-propagates through the implanted region of the substrate until the thin film of material is removed.").

Although *Henley* does discuss the utilization of thermal sources to assist with the cleaving action, there is absolutely no mention of the heat being applied uniformly over the substrate material. *See*, e.g., *id.*, col. 7, lines 39-41 (listing numerous non-uniform thermal sources, including flood, time-varying, spatially varying, and continuous applications). As explained in the present application, subjecting a wafer to an environment at a constant temperature is not the same as applying heat substantially uniformly over a surface. To accomplish uniform surface heating, the amount of heat provided often needs to be varied at different locations with respect to the wafer. *See*, e.g., present claim 9 and parpagraph [0049] of the Published Application ("By selectively controlling the supply to the heating elements, ... a spatially homogeneous, evenly distributed amount of heat may be applied to the wafers ... over substantially the entire weakened zone of each wafer."). There is no suggestion to do this in *Henley.*

On the contrary, *Henley* specifically states that the disclosed invention "*does not* require increasing the *entire* substrate temperature to initiate and sustain the cleaving action as [with] pre-existing techniques." *Henley*, col. 10, lines 21-24 (emphasis added). This suggests the existence of a temperature gradient within the substrate. Certainly, *Henly* desires to obtain controlled cleaving and to do this he teaches that energy is provided in a localized way to selected portions of the wafer, i.e., the edge. Therefore, it is clear from *Henley*'s specification that uniform heating is not desired and does not occur either in theory or in practice. Thus, *Henley* is essentially teaching away from the very property that the Examiner is relying upon it to provide. Whereas an essential element of the Examiner's invalidity argument is that "Henley has suggested the use of uniform heating of the entire substrate ... to initiate the cleaving action" (Office Action mailed June 29, 2007, at 7), the evidence presented above points directly the opposite.

As a result, neither *Ohmi* nor *Henley* disclose a method of detaching a wafer comprising, inter alia, creating a weakened zone and applying heat substantially evenly over substantially the

entire weakened zone. The result is that neither *Ohmi* nor *Henley* teach or suggest all the recitations of the present claims. *See* M.P.E.P. § 2143. For at least this reason, Applicants respectfully request that the rejection of claims 1, 4, 8-12, and 14-22 under 35 U.S.C. § 103(a) be withdrawn.

Likewise, the Examiner has not shown any suggestion or motivation either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to combine reference teachings of *Ohmi* and *Henley* such that claims 1, 4, 8-12, and 14-22 are rendered obvious. *See* M.P.E.P. § 2143. Even after the Supreme Court's decision in *KSR v. Teleflex*, Examiners are directed that "in formulating a rejection under 35 U.S.C. § 103(a) based upon a combination of prior art elements, it remains necessary to identify the reason why a person of ordinary skill in the art would have combined the prior art elements in the manner claimed." Memorandum from Margaret Focarino, Deputy Commissioner of Operations, USPTO, to USPTO technology art unit directors, "Supreme Court decision on KSR Int'l. Co. v. Teleflex, Inc." (May 3, 2007).

Here, the Examiner simply alleges that "since Ohmi and Henley are from the same field of endeavor," "it would have been obvious to a person of ordinary skill in the art at the time the invention was made to incorporate the controlled-cleaving process of Henley into the delamination process of Ohmi...." Office Action mailed June 29, 2007, at 4. In the present case, this clearly is not sufficient to support the rejection, particularly in view of the fact that even if so combined the references do not result in what is presently claimed. In addition, Applicants respectfully submit that the disclosures of the two references actually teach away from their combination.

It is well known by one of ordinary skill in the art that one goal of a method of detaching a layer from a wafer is the minimization of the surface roughness after detachment. This is especially true of the roughness at the zone of detachment, which is always rougher than the rest of the wafer. As discussed in the Office Action Response dated May 21, 2007 ("previous Office Action response"), incorporated by reference herein in full, when a wafer is subjected to an inhomogeneous heating source, "hot points" or "hot regions" can occur, which correspond to areas in the weakened zone receiving a locally greater amount of heat because of temperature inhomogeneities in the furnace. *See* Published Application at [0042]. When a wafer hot point subsequently is subjected to annealing, detachment is initiated at the hot region, with the result

being that the local roughness of the detached layer is greater near the level of the hot region than at the general layer. *Id.* at [0057]. Internal detachment at such hot points is something that *Ohmi* specifically teaches against. *See generally Ohmi*, col. 10, lines 18-38 (describing how an external force is applied to a peripheral portion of the composite member, whereby the *peripheral* portion collapses, followed by the remainder of the composite member, the result being the separation of the member into two layers). In contrast, given that *Henley* clearly does not teach applying heat substantially evenly over a wafer, *see supra*, it can be argued that hot spots would occur, the result being that *Henley* actually teaches away from a combination with *Ohmi*.

In conclusion, the Examiner has not provided any facts as to where in *Ohmi* or *Henley* the suggestion or motivation is found to combine the references such that the present invention would be rendered obvious. Therefore, Applicants respectfully request that the Examiner withdraw the rejection of claims 1, 4, 8-12, and 14-22.

B. Claim 13

Claim 13 was rejected under 35 U.S.C. § 103(a) as being unpatentable over *Ohmi* in view of *Henley* and U.S. Patent Application No. 2003/0234075 to Aspar et al. ("*Aspar*") for the reasons disclosed on page 6 of the Office Action. Applicants respectfully disagree and traverse this rejection for at least the following reasons.

Aspar does not remedy the deficiencies of *Ohmi* and *Henley*, because it neither teaches nor suggests all the recitations of claim 13, including the recitations of claim 1, from which claim 13 ultimately depends. As discussed in the previous Office Action response, *Aspar* discloses a method for cutting a block of material and the formation of a thin, transferable film. This may be accomplished by cutting out a block of material and separating the thin film through the application of "a thermal treatment and/or the application of mechanical forces acting between the superficial part and the embrittled zone." *See Aspar*, page 1 at [0018].

Indeed, as with the heating sources in *Henley*, the thermal treatments used as a means of starting the separation in *Aspar* involve the use of heating sources that have previously been shown – and that would be recognized by one of ordinary skill in the art – to provide uneven surface heating. *See Aspar*, page 3 at [0055] ("separation initiator can be provoked by overheating the substrate locally (for example with the aid of a laser or a local heat source).").

Moreover, the Examiner fails to provide any discussion of how heating sources in *Aspar* would apply heat substantially evenly over substantially the entire embrittled or weakened zone. The result is that *Aspar* does not rectify the deficiencies found in *Ohmi* and *Henley* disclosed above and does not disclose or teach all of the claim recitations found in claim 13, including claim 1 from which it depends.

Moreover, the Examiner's alleges that "it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the combined method disclosed by *Ohmi* and *Henley* as suggested by *Aspar* because of the desirability to minimize process steps." Office Action mailed June 29, 2007, at 6. The Examiner fails to provide *any* additional support for this assertion, falling far short of the necessary goal required to establish such motivation. *See* M.P.E.P. § 2143.

For at least these reasons, Applicants maintain that the present invention is not obvious and respectfully request that the rejection of claim 13 under 35 U.S.C. § 103(a) be withdrawn.

III. Conclusion

Accordingly, as all rejections have been overcome, it is believed that the entire application is now in condition for allowance, early notice of which would be appreciated. In the event that the Examiner does not agree that all claims are now allowable, a personal or telephonic interview is respectfully requested to discuss any remaining issues in an effort to expedite the eventual allowance of this application.

Respectfully submitted,

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Date

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